United Nations A/AC.105/761

General Assembly

Distr.: General
2 March 2001

Original: English

Committee on the Peaceful Uses of Outer Space
Forty-fourth session
Vienna, 6-15 June 2001

Report of the Scientific and Technical Subcommittee on its thirty-eighth session, held in Vienna from 12 to 23 February 2001

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I. Introduction

1. The Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space held its thirty-eighth session at the United Nations Office at Vienna from 12 to 23 February 2001 under the chairmanship of Karl Doetsch (Canada).

2. The Subcommittee held 17 meetings.

A. Attendance

3. Representatives of the following member States of the Committee attended the session: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Burkina Faso, Canada, Chile, China, Colombia, Czech Republic, Ecuador, Egypt, France, Germany, Greece, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Kazakhstan, Kenya, Lebanon, Malaysia, Mexico, Morocco, Netherlands, Nigeria, Pakistan, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, South Africa, Spain, Sudan, Sweden, Syrian Arab Republic, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Venezuela and Viet Nam.

4. Representatives of the following United Nations entities attended the session: secretariat for the International Strategy for Disaster Reduction, Office of the United Nations High Commissioner for Refugees (UNHCR), United Nations Educational, Scientific and Cultural Organization (UNESCO), International Telecommunication Union (ITU), World Meteorological Organization (WMO) and International Atomic Energy Agency (IAEA).

5. The session was also attended by representatives of the European Space Agency (ESA), the International Mobile Satellite Organization (IMSO), the Committee on Space Research (COSPAR), the International Academy of Astronautics (IAA), the International Astronautical Federation (IAF), the International Astronomical Union (IAU), the International Society for Photogrammetry and Remote Sensing (ISPRS) and the International Space University (ISU).

6. At the 544th and 546th meetings, on 12 and 13 February 2001, the Chairman informed the Subcommittee that requests had been received from the permanent representatives of Algeria, Costa Rica, Cuba, the Democratic People's Republic of Korea, the Republic of Korea, Saudi Arabia, Slovakia and Switzerland to attend the session. Following past practice, they were invited to send delegations to attend the current session of the Subcommittee and to address it as appropriate, without prejudice to further requests of that nature; that action did not involve any decision of the Subcommittee concerning status but was a courtesy that the Subcommittee extended to those delegations.

7. A list of the representatives of member States, United Nations entities and other international organizations attending the session is contained in document A/AC.105/C.1/INF.30.

B. Adoption of the agenda

8. At its 544th meeting, on 12 February 2001, the Subcommittee adopted the following agenda:

1. Adoption of the agenda.
2. Election of the Chairman.
3. Statement by the Chairman.
4. General exchange of views and introduction to reports submitted on national activities.
5. United Nations Programme on Space Applications following the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III).
6. Matters relating to remote sensing of the Earth by satellite, including applications for developing countries and monitoring of the Earth's environment.
7. Use of nuclear power sources in outer space.
8. Means and mechanisms for strengthening inter-agency cooperation and increasing the use of space applications and services within and among entities of the United Nations system.
9. Implementation of an integrated, space-based global natural disaster management system.

10. Space debris.

11. Examination of the physical nature and technical attributes of the geostationary orbit and of its utilization and applications, including, inter alia, in the field of space communications, as well as other questions relating to developments in space communications, taking particular account of the needs and interests of developing countries.

12. Government and private activities to promote education in space science and engineering.

13. Draft provisional agenda for the thirty-ninth session of the Scientific and Technical Subcommittee.

14. Report to the Committee on the Peaceful Uses of Outer Space.

C. Documentation

9. A list of the documents that were before the Subcommittee is provided in annex I to the present report.

D. Election of the Chairman

10. At the 544th meeting, on 12 February 2001, Karl Doetsch (Canada) was elected Chairman of the Subcommittee for a three-year term of office, from 2001 to 2003.

E. General statements

11. Statements were made by representatives of the following delegations during the general exchange of views: Algeria, Argentina, Austria, Brazil, Burkina Faso, Canada, Chile, China, Colombia, Czech Republic, France, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Italy, Japan, Malaysia, Morocco, Pakistan, Peru, Republic of Korea, Romania, Russian Federation, Sweden, Turkey, United Kingdom and United States of America. The representative of Peru also made a statement on behalf of the Group of Latin American and Caribbean States. Statements were also made by the observers for IAF, IAU and ISPRS.

12. The observer for Slovakia made a technical presentation entitled "Recent activities of the Slovak Republic on the exploration and peaceful uses of outer space".

13. At the 544th meeting, on 12 February 2001, the Chairman made a statement outlining the work of the Subcommittee at its current session and reviewing space activities over the past year, including important advances that had been achieved as a result of international cooperation.

14. At the 544th meeting, the Director of the Office for Outer Space Affairs of the Secretariat made a statement reviewing the work programme of the Office. At the 547th meeting, on 13 February 2001, the Expert on Space Applications made a statement outlining the activities carried out and planned under the United Nations Programme on Space Applications. The Director noted the reduced appropriation for the Office in the regular budget of the United Nations for the biennium 2000-2001. It was stated that, for that reason, the Office might have to postpone some activities, including activities related to public outreach and space law and possibly activities of the United Nations Programme on Space Applications for 2001.

15. The Subcommittee noted with appreciation that the Governments of France and the Republic of Korea had provided associate experts to assist the Office for Outer Space Affairs in carrying out its work relating to implementation of the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III).

16. Some delegations expressed the view that the practice of sharing seats on a rotating basis should be ended and that States sharing seats on a rotating basis, namely Cuba, Malaysia, Peru and the Republic of Korea, should become full members of the Committee on the Peaceful Uses of Outer Space. Some delegations expressed support for the candidature of other States, including Saudi Arabia and Slovakia, which, in the view of those delegations, had demonstrated a high level of capability in space science and technology and a high level of interest in the work of the Committee.

F. National reports

17. The Subcommittee took note with appreciation of the reports submitted to it by Member States (A/AC.105/752 and Add.1 and 2) under agenda item 4, entitled "General exchange of views and introduction to reports submitted on national activities". The Subcommittee recommended that the Secretariat continue to invite Member States to submit annual reports on their space activities.

G. Symposia

18. In accordance with General Assembly resolution 55/122 of 8 December 2000, a symposium on the theme "Terrestrial hazards from outer space objects and phenomena" was organized by COSPAR and IAF. The first part of the symposium, entitled "Natural hazards from outer space", was held on 12 February 2001 and was chaired by G. Haerendel, representing COSPAR, and co-chaired by D. Rex, representing IAF. The second part of the symposium, entitled "Hazards from human activity in outer space", was held on 13 February 2001 and was chaired by D. Rex, representing IAF, and co-chaired by J. Andersen, representing COSPAR.

19. The presentations to the symposium included the following: "Overview of short-term solar activity variations on the terrestrial environment", by H. Koskinen of COSPAR; "The influence of the 11-year solar cycle on the atmosphere", by K. Labitzke of COSPAR; "Assessment of collision hazards from Near Earth Objects", by H. Rickman of COSPAR; "Influence of radiation from celestial objects on the terrestrial environment", by J. Schmitt of COSPAR; "Overview of environmental issues related to human space activities", by R. Crowther of IAF; "Possible biological contamination from space missions", by J. D. Rummel of COSPAR; "Predicting the time and location of the re-entry of artificial space objects", by N. A. Anfimov of IAF; and "Maintaining a clear sky: effects of space activities on astronomy", by R. J. Cohen of COSPAR.

20. In accordance with General Assembly resolution 55/122, a symposium on the theme "Emerging applications of global navigation satellite systems: a new utility with global benefits" was held on 19 February 2001 to strengthen the partnership of the Subcommittee with industry. The symposium was moderated by B. Mahone of Aerospace Industries Association of America, Inc.

21. The presentations to the symposium included the following: "Current status and perspectives of the use of the GLONASS space navigation system", by S. V. Kulik of the Russian Aviation and Space Agency; "Emerging applications of the Global Positioning System", by B. Mahone of the Aerospace Industries Association of America, Inc.; "Galileo international negotiations", by H. Kuhlen of Galileo Industries SA; "Research status of satellite navigation techniques of NASDA", by M. Mokuno of the National Space Development Agency (NASDA) of Japan; "Introduction of GNSS applications in the ICAO African and Indian Ocean (AFI) region", by P. Zo'o-Minto'o of the International Civil Aviation Organization (ICAO); and "Economic and social benefits for the countries of Latin America and the Caribbean from the use of new satellite technologies", by C. Carmona of CEC Satellite Systems.

22. The presentations to the symposium were followed by a panel discussion on the theme "GNSS as a global utility: promoting the applications of GNSS through international cooperation" and an announcement of the Global Navigation Satellite System (GNSS) workshops of the United Nations Programme on Space Applications.

H. Adoption of the report of the Scientific and Technical Subcommittee

23. After considering the various items before it, the Subcommittee, at its 560th meeting, on 23 February 2001, adopted its report to the Committee on the Peaceful Uses of Outer Space, containing its views and recommendations as set out in the paragraphs below.

II. United Nations Programme on Space Applications following the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)

24. In accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee continued its consideration of the item on the United Nations Programme on Space Applications following the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III).

25. The representatives of Brazil, France, India, Japan, Morocco and the United States made statements under this agenda item. A statement was also made by the observer for ESA.

26. Pursuant to a recommendation by the Working Group of the Whole (A/AC.105/736, annex II, para. 20), the observer for the Space Generation Advisory Council made a presentation entitled "Report on Space Generation Advisory Council activities".

27. In accordance with General Assembly resolution 55/122, the Subcommittee, at its 547th meeting, reconvened the Working Group of the Whole, under the chairmanship of Muhammad Nasim Shah (Pakistan). The Working Group of the Whole held nine meetings from 14 to 22 February 2001. The Subcommittee agreed that Karl Doetsch (Canada) would temporarily serve as Chairman of the Working Group of the Whole during the elected Chairman's absence at its meetings held from 19 to 22 February 2001.

28. The Subcommittee recalled that the Committee on the Peaceful Uses of Outer Space, at its forty-third session, had agreed that the Subcommittee should be assigned the task of discussing and reaching a consensus on the implementation of the recommendations of UNISPACE III and their associated work plans and of reporting to the Committee each year the findings and recommendations of the Subcommittee for the Committee for final approval and/or modifications. The Subcommittee also recalled that the Committee had agreed that the Subcommittee should be charged, in the first instance, with conducting its deliberations on the matter in its Working Group of the Whole.[1]

29. At its 560th meeting, on 23 February 2001, the Subcommittee endorsed the report of the Working Group of the Whole, which is contained in annex II to the present report.

A. United Nations Programme on Space Applications

30. The Subcommittee had before it the report of the Expert on Space Applications (A/AC.105/750). The report was supplemented by a statement from the Expert. The Subcommittee noted that the United Nations Programme on Space Applications for 2000 had been carried out satisfactorily and commended the work accomplished by the Expert in that regard.

31. The Subcommittee noted with appreciation that, since its previous session, additional contributions for 2000 had been offered by various Member States and organizations and had been acknowledged in the report of the Expert (A/AC.105/750, paras. 34-35). The Subcommittee also noted with appreciation that the Government of Austria had once again provided an associate expert to support the implementation of the United Nations Programme on Space Applications.

32. The Subcommittee continued to express its concern over the still limited financial resources available for carrying out the United Nations Programme on Space Applications and appealed to Member States to support the Programme through voluntary contributions. The Subcommittee was of the view that the limited resources of the United Nations should be focused on the activities with the highest priority; it noted that the United Nations Programme on Space Applications was the priority activity of the Office for Outer Space Affairs.

33. The Subcommittee noted that the United Nations Programme on Space Applications was assisting developing countries and countries with economies in transition in participating in and benefiting from space-related activities as proposed in the recommendations of UNISPACE III, particularly those contained in the Vienna Declaration on Space and Human Development.[2]

34. The Subcommittee noted that the United Nations Programme on Space Applications was aimed at promoting, through international cooperation, the use of space technologies and space-related data for sustainable economic and social development in developing countries by raising the awareness of decision makers of the cost-effectiveness and additional benefits to be obtained; establishing or strengthening the capacity in developing countries to use space technology; and strengthening outreach activities to disseminate awareness of the benefits obtained. The Subcommittee also noted that, in implementing the Programme, the Expert on Space Applications would take into consideration the guidelines provided by the Working Group of the Whole, contained in annex II to the present report.

35. The Subcommittee noted that, in addition to the United Nations conferences, training courses, workshops and symposia planned for 2001 (see para. 43 below), there would be other activities of the Programme in 2001, focusing on:

(a) Supporting education and training for building capacity in developing countries, particularly through the regional centres for space science and technology education, including the Network of Space Science and Technology Education and Research Institutions in Central Eastern and South-Eastern Europe;

(b) Providing technical assistance to promote the use of space technologies in development programmes, in particular by continuing to support or initiate pilot projects as follow-up to past activities of the Programme;

(c) Enhancing access to space-related data and other information for dissemination to the general public and carrying out outreach activities to promote the participation of youth in space activities.

1. Year 2000

United Nations conferences, training courses and workshops

36. With regard to the activities of the United Nations Programme on Space Applications carried out in 2000, the Subcommittee expressed its appreciation to the following:

(a) The Government of Sweden, represented by the Swedish International Development Cooperation Agency, for co-sponsoring the Tenth United Nations/Sweden International Training Course on Remote Sensing Education for Educators, hosted by the University of Stockholm and the Swedish Space Corporation and held in Stockholm and Kiruna, Sweden, from 2 May to 9 June 2000;

(b) The Government of France, as well as ESA and the Centre national d'études spatiales (CNES), for co-sponsoring the Ninth United Nations/European Space Agency Workshop on Basic Space Science: Satellites and Networks of Telescopes—Tools for Global Participation in the Study of the Universe, hosted by the Ecole nationale supérieure de l'aéronautique et de l'espace, Université Paul Sabatier and Observatoire Midi-Pyrénées and held in Toulouse, France, from 27 to 30 June 2000;

(c) The Government of Austria, as well as ESA, for co-sponsoring the United Nations/ Austria/ European Space Agency Symposium on Enhancing the Participation of Youth in Space Activities, hosted by the Technical University of Graz and held in Graz, Austria, from 11 to 14 September 2000;

(d) The Government of Brazil, as well as IAF, ESA and CNES, for co-sponsoring the United Nations/International Astronautical Federation Workshop on an Operational Strategy for Sustainable Development Using Space, hosted by the National Institute for Space Research (INPE) of Brazil and held in São José dos Campos, Brazil, from 28 to 30 September 2000;

(e) IAA, for co-sponsoring the United Nations/ International Academy of Astronautics Workshop on Small Satellites at the Service of Developing Countries: the Latin American Experience, held in Rio de Janeiro on 5 October 2000, within the framework of the fifty-first International Astronautical Congress;

(f) The Government of Chile, as well as ESA, for co-sponsoring the United Nations/Chile/European Space Agency Workshop on the Use of Space Technology in Disaster Management, hosted by the Universidad de La Serena and held in La Serena, Chile, from 13 to 17 November 2000;

(g) The Government of Malaysia, for co-sponsoring the United Nations/Malaysia Workshop on Bridging the Digital Divide: Space Technology Solutions, hosted by the Ministry of Science, Technology and the Environment of Malaysia and held in Kuala Lumpur from 20 to 24 November 2000;

(h) The Government of India, as well as ESA, for co-sponsoring the Third United Nations/European Space Agency/Committee on Space Research Workshop on Satellite Data Reduction and Analysis Techniques, hosted by the Indian Space Research Organisation (ISRO), the Indian Institute of Remote Sensing and the Centre for Space Science and Technology Education in Asia and the Pacific and held in Dehra Dun, India, from 27 to 30 November 2000.

Long-term fellowships for in-depth training

37. The Subcommittee expressed appreciation to ESA for having offered three fellowships in 2000 for research in remote sensing technology at the European Space Research Institute (ESRIN) facilities of ESA in Frascati, Italy, and for offering for 2001 three fellowships in satellite communications and antenna propagation theory at the European Space Technology Centre of ESA in Noordwijk, Netherlands, and two fellowships in remote sensing technology at ESRIN.

38. The Subcommittee noted that it was important to increase the opportunities for in-depth education in all areas of space science, technology and applications projects through long-term fellowships and urged Member States to make such opportunities available at their relevant institutions.

Short-term fellowships for technical training

39. The Subcommittee expressed appreciation to the Government of China for having offered three short-term fellowships in 2000 for training in satellite design, engineering, mission analysis and orbit control at the Harden Institute of Technology, Northwest Polytechnic University in Xi'an and Beijing University of Aeronautics and Astronautics.

Technical advisory services

40. The Subcommittee took note of the following technical advisory services provided under the United Nations Programme on Space Applications in support of activities and projects promoting regional and global cooperation in space applications:[3]

(a) Collaboration with ESA and Japan on follow-up activities relating to the series of workshops on basic space science;

(b) Providing assistance to support the growth and operation of the Asia-Pacific Satellite Communications Council (APSCC), as well as technical assistance in the preparations for the APSCC 2000 Conference and Exhibition, entitled "New Vision for Satellite Communication in the 21st Century";

(c) Collaboration with the American Institute of Aeronautics and Astronautics on the sixth workshop on the theme "International space cooperation: addressing challenges of the new millennium", to be held in Seville, Spain, from 11 to 15 March 2001, including sponsorship of participants from developing countries;

(d) Collaboration with the Sociedad de Especialistas Latinoamericanos en Percepción Remota (SELPER), and the African Association of Remote Sensing of the Environment to enable the participation of specialists from those regions in the annual meeting and symposium organized by each of those organizations in 2000;

(e) Collaboration with the Disaster Management Support Group of the Committee on Earth Observation Satellites (CEOS) in identifying the concerns of institutions from developing countries with disaster management functions for inclusion in the work of the Support Group. Collaboration with the ad hoc Working Group on Education and Training of CEOS in identifying and recommending action that CEOS members might take to strengthen the capacity of developing countries to utilize Earth observation data;

(f) Collaboration with ESA and the Department of Economic and Social Affairs of the Secretariat in providing technical and training assistance required for implementing projects on the use of Earth observation data for monitoring glaciers and snow cover in Latin America and for coastal management in Asia aimed at strengthening the capacity of participating institutions in the use of Earth observation data for resource management.

Promotion of greater cooperation in space science and technology

41. The Subcommittee noted that the United Nations Programme on Space Applications had co-sponsored the participation of scientists from developing countries in the United Nations/International Astronautical Federation Workshop on an Operational Strategy for Sustainable Development Using Space, held in São José dos Campos in September 2000, and the participation of those scientists in the fifty-first International Astronautical Congress, held in Rio de Janeiro from 2 to 6 October 2000.

42. The Subcommittee noted that the United Nations Programme on Space Applications had co-sponsored the participation of scientists from developing countries in the thirty-third Scientific Assembly of the Committee on Space Research, held in Warsaw from 16 to 23 July 2000.

2. Year 2001

United Nations conferences, training courses, workshops and symposia

43. The Subcommittee recommended the approval of the following programme of training courses, workshops and symposia planned for 2001:

(a) United Nations/European Space Agency/Committee on Space Research Workshop on Data Analysis Techniques, to be held in Damascus from 25 to 29 March 2001;

(b) Eleventh United Nations/Sweden International Training Course on Remote Sensing Education for Educators, to be held in Stockholm and Kiruna, Sweden, from 2 May to 9 June 2001;

(c) Tenth United Nations/European Space Agency Workshop on Basic Space Science, to be held in Reduit, Mauritius, from 25 to 29 June 2001;

(d) United Nations/European Space Agency Workshop on Remote Sensing for Environmental Monitoring and Natural Resource Management, to be held in Prague from 2 to 5 July 2001;

(e) First United Nations/United States of America Workshop on the Use of Global Navigation Satellite Systems, to be held in Kuala Lumpur from 20 to 24 August 2001;

(f) United Nations Expert Meeting on the Regional Centres for Space Science and Technology Education: Status and Future Development, to be held in Frascati, Italy, from 3 to 7 September 2001;

(g) Second United Nations/Austria/European Space Agency Symposium on Enhancing the Participation of Youth in Space Activities, to be held in Graz, Austria, in September 2001;

(h) United Nations/International Astronautical Federation Workshop on Making Space Applications Operational: Opportunities and Challenges for Sustainable Development, to be held in Albi, France, from 27 to 29 September 2001;

(i) United Nations/International Academy of Astronautics Workshop on Small Satellites at the Service of Developing Countries: the African Perspective, to be held in Toulouse, France, during the fifty-second International Astronautical Congress in October 2001;

(j) United Nations/European Space Agency Workshop on the Use of Space Technology for Disaster Management, to be held in Beirut in the second half of 2001;

(k) Second United Nations/United States of America Workshop on the Use of Global Navigation Satellite Systems, to be held in Vienna from 26 to 30 November 2001;

(l) United Nations Workshop on the Use of Earth Observation as an Instrument for Solving Development Problems in Sub-Saharan Africa, to be held in southern Africa in the second half of 2001;

(m) The following workshops and training courses to be organized at the regional centres for space science and technology education, affiliated to the United Nations:

(i) In India:

a. International Short Course on Applications of Space Science and Technology for Social Scientists of the Asia-Pacific region, to be held from 9 to 21 July 2001;

b. Training Programme on Coastal Land Use, in collaboration with the United Nations Industrial Development Organization and the Centre opérationnel pour la sous-traitance et le partenariat, to be held in 2001;

c. Course on Satellite Meteorology Applications, to be held from 9 to 13 April 2001;

d. Short-term Course on Remote Sensing and Geographic Information Systems, to be held from 27 August to 7 September 2001;

(ii) In Morocco: Workshop on Satellite Meteorology, Remote Sensing and Geographic Information Systems, to be held in 2001;

(iii) In Nigeria: Workshop on Satellite Meteorology, to be held in 2001.

3. Year 2002

44. The Subcommittee noted that the following activities had been proposed for 2002:

(a) Twelfth United Nations/Sweden International Training Course on Remote Sensing Education for Educators, to be held in Stockholm and Kiruna, Sweden;

(b) Third United Nations/United States of America Workshop on the Use of Global Navigation Satellite Systems, for the benefit of developing countries in Latin America and the Caribbean;

(c) United Nations/European Space Agency Workshop on the Use of Space Technology in Disaster Management, for the benefit of developing countries in Asia and the Pacific;

(d) Fourth United Nations/United States of America Workshop on the Use of Global Navigation Satellite Systems, for the benefit of developing countries in Africa;

(e) United Nations/International Astronautical Federation Workshop on the Use of Space Technology for the Benefit of Developing Countries, to be held in Houston, United States, in October 2002;

(f) Eleventh United Nations/European Space Agency Workshop on Basic Space Science, for the benefit of developing countries in Latin America and the Caribbean, to be held in Brazil;

(g) Third United Nations/Austria/European Space Agency Symposium on Enhancing the Participation of Youth in Space Activities, to be held in Graz, Austria, in September 2002;

(h) United Nations/United States of America International Meeting of Experts on the Use of Global Navigation Satellite Systems;

(i) United Nations/European Space Agency Workshop on the Use of Space Technology in Disaster Management, for the benefit of countries in eastern Europe;

(j) Several workshops to be organized at the regional centres for space science and technology education.

B. International space information service

45. The Subcommittee noted with satisfaction that the twelfth in the series of documents containing selected papers from the activities of the Programme, entitled *Seminars of the United Nations Programme on Space Applications*,[4] had been issued. The Subcommittee also noted with satisfaction the publication of *Highlights in Space 2000*,[5] which had been compiled from a report prepared by COSPAR on space research and a report prepared by IAF on space technology and applications, and expressed its appreciation to COSPAR, IAF and the International Institute of Space Law for their contributions.

46. The Subcommittee noted with satisfaction that the Secretariat had continued to enhance the International Space Information Service. Information on the activities of the Office for Outer Space Affairs was available on its web site (http://www.oosa.unvienna.org), which, having been restructured, contained General Assembly resolutions and documents such as reports on national space activities, in all official languages of the United Nations. The Subcommittee also noted with satisfaction that the Secretariat was integrating the International Aerospace Information Network into the International Space Information Service, thereby facilitating access to aerospace and aerospace-related information of cooperating States, and that the online index of objects launched into outer space would also be made available on the World Wide Web, so that that information could be accessed in a quick and efficient manner.

47. The Subcommittee noted with satisfaction that, in response to recommendations made at the Inter-Agency Meeting on Outer Space Activities, the Secretariat had

developed a web site (http://www.uncosa.unvienna.org) to enhance the access to information on and coordination of outer space activities within the United Nations system. The web site also included a calendar of space-related activities conducted by the United Nations system.

C. Regional and interregional cooperation

48. The Subcommittee noted with appreciation the continuing efforts undertaken by the United Nations Programme on Space Applications, in accordance with General Assembly resolution 45/72 of 11 December 1990, in leading an international effort to establish regional centres for space science and technology education in existing national or regional educational institutions in developing countries, as contained in the document entitled "Regional centres for space science and technology education (affiliated to the United Nations)" (A/AC.105/749). The Subcommittee also noted that, once established, each centre could expand and become part of a network that could cover specific programme elements in established institutions related to space science and technology in each region.

49. The Subcommittee recalled that the General Assembly, in its resolution 50/27 of 6 December 1995, had endorsed the recommendation of the Committee that the centres be established on the basis of affiliation to the United Nations as early as possible and that such affiliation would provide the centres with the necessary recognition and would strengthen the possibilities of attracting donors and of establishing academic relationships with national and international space-related institutions.

50. The Subcommittee noted with satisfaction that the African Regional Centre for Space Science and Technology—in French Language had held in 2000 a workshop on remote sensing and geographic information systems, followed by a nine-month course on the same subjects, and a workshop on satellite communications, also followed by a nine-month course on that subject. The Subcommittee also noted that a nine-month course on satellite meteorology, remote sensing and geographic information systems was scheduled to begin in 2001.

51. The Subcommittee noted with satisfaction that the African Regional Centre for Space Science and Technology Education—in English Language had held in 2000 a workshop on remote sensing and geographic information systems followed by a nine-month training course on the same subjects. The Subcommittee also noted that a training course on satellite communications was scheduled to begin in 2001.

52. The Subcommittee noted with satisfaction that the Centre for Space Science and Technology Education in Asia and the Pacific had held in Dehra Dun, India, its second Advisory Committee Meeting on 4 July 2000 and its fifth Governing Board Meeting on 6 July 2000. Over the past five years, the Centre had concluded 10 nine-month postgraduate courses in remote sensing and geographic information systems, satellite meteorology, satellite communications and space and atmospheric sciences, as well as a number of short-term training courses and workshops. Moreover, the Centre had trained 226 participants from 33 developing countries. The Subcommittee also noted that the third postgraduate course in satellite communications and the sixth postgraduate course in remote sensing and geographic information systems were scheduled to begin in 2001.

53. The Subcommittee noted with satisfaction that, with the assistance of the Office for Outer Space Affairs, the member States concerned in Asia and the Pacific had continued to undertake consultations with a view to making the Centre for Space Science and Technology Education in Asia and the Pacific grow into a network of nodes.

54. The Subcommittee noted with satisfaction that the headquarters agreement for the operation of the Regional Centre for Space Science and Technology Education in Latin America and the Caribbean had been signed between the Government of Brazil and the secretariat of the Centre in Brasilia on 12 September 2000.

55. The Subcommittee noted with satisfaction that, following the review of a report on an evaluation mission and of offers and commitments made by interested Governments, Jordan had been identified as the country that would host the Regional Centre for Space Science and Technology Education in Western Asia. The Office for Outer Space Affairs had announced the establishment and location of the Centre.

56. The Subcommittee noted with satisfaction that the Steering Committee of the Network of Space Science and Technology Education and Research Institutions for Central Eastern and South-Eastern Europe had agreed to establish multilateral scientific cooperation among the core institutions of the Network and that the corresponding cooperation agreement would be signed by the duly authorized representatives of the core institutions during the forty-fourth session of the Committee.

57. The Subcommittee emphasized the importance of regional and international cooperation in making the benefits of space technology available to all countries by such cooperative activities as sharing payloads, disseminating information on spin-off benefits and ensuring compatibility of space systems.

III. Matters relating to remote sensing of the Earth by satellite, including applications for developing countries and monitoring of the Earth's environment

58. In accordance with General Assembly resolution 55/122, the Subcommittee continued its consideration of the item relating to remote sensing of the Earth.

59. In the course of the debate, delegations reviewed national and cooperative programmes in remote sensing. Examples were given of national programmes and of bilateral, regional and international cooperation, including programmes of technical cooperation among developing countries and programmes of countries with advanced capabilities to provide assistance to developing countries. The representatives of Argentina, Austria, Brazil, Canada, China, Germany, India, Japan, Morocco, the Russian Federation and the United States made statements under this agenda item.

60. The following technical presentations were made on the issue of remote sensing of the Earth by satellite:

(a) "Application system of satellite CBERS-1 and its data application in China", by the representative of China;

(b) "Russian space systems for remote sensing", by the representative of the Russian Federation;

(c) "The Global Learning and Observations to Benefit the Environment (GLOBE) programme", by the representative of the United States.

61. The Subcommittee emphasized the importance of providing non-discriminatory access to state-of-the-art remote sensing data and to derived information at reasonable cost and in a timely manner and of building capacity in the adoption and use of remote sensing technology, in particular to meet the needs of developing countries.

62. The Subcommittee considered that international cooperation in the use of remote sensing satellites should be encouraged. It noted the importance of compatibility and complementarity of existing and future remote sensing systems, as well as the need for continuity in the acquisition of data. The Subcommittee also noted the importance, particularly for developing countries, of sharing experiences and technologies, of cooperating through international and regional remote sensing centres and of working on collaborative projects. The Subcommittee took note of the important contributions made by organizations such as CEOS and by mechanisms such as the Integrated Global Observing Strategy towards international cooperation in matters relating to remote sensing.

63. The Subcommittee emphasized the importance of remote sensing systems for advancing sustainable development, including monitoring of the Earth's environment, management of natural resources, disaster monitoring and prevention and climate monitoring.

IV. Use of nuclear power sources in outer space

64. In accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee continued its consideration of the item on the use of nuclear power sources in outer space under the work plan that it had adopted at its thirty-fifth session (A/AC.105/697 and Corr.1, annex III, appendix). In accordance with the work plan, the Subcommittee reviewed national and international processes, proposals and standards and national working papers

relevant to the launch and peaceful use of nuclear power sources in outer space.

65. The Subcommittee had before it the following documents:

(a) Note by the Secretariat, entitled "National research on space debris, safety of space objects with nuclear power sources on board and problems of their collisions with space debris" (A/AC.105/751 and Add.1 and 2);

(b) Report by the International Atomic Energy Agency (IAEA) entitled "Preliminary review of international documents relevant to the safety of nuclear power sources in outer space" (A/AC.105/754);

(c) Working paper submitted by the Russian Federation entitled "Collisions between nuclear power sources and space debris" (A/AC.105/C.1/L.246);

(d) Working paper submitted by the Russian Federation entitled "National research on safety of space objects carrying nuclear power sources, including information on national procedures for obtaining final authorization to launch such objects" (A/AC.105/C.1/L.247);

(e) Working paper submitted by the United Kingdom entitled "Convention on Nuclear Safety and the Safety Fundamentals of the International Atomic Energy Agency: a common approach to the safety of terrestrial nuclear power sources" (A/AC.105/C.1/L.242);

(f) Working paper submitted by the United Kingdom entitled "Review of international documents on radiation protection of particular relevance to nuclear power sources in outer space" (A/AC.105/C.1/L.245);

(g) Working paper submitted by the United States entitled "A database of international documents of potential relevance to nuclear power sources in outer space" (A/AC.105/C.1/L.244).

66. The representatives of Argentina, Brazil, France, Nigeria, the Russian Federation, the United Kingdom and the United States made statements under this agenda item. In addition, the Subcommittee heard two technical presentations under this agenda item by representatives of the United States of America entitled "International documents of potential relevance to nuclear power sources in outer space" and "Nuclear power source launch approval process in the United States".

67. The Subcommittee recalled that the General Assembly, in its resolution 47/68 of 14 December 1992, had adopted the Principles Relevant to the Use of Nuclear Power Sources in Outer Space, contained in that resolution. The Subcommittee noted that the Committee on the Peaceful Uses of Outer Space, at its forty-third session, had recalled its agreement that the Principles should remain in their current form until amended and that, before making any amendment to the Principles, proper consideration should be given to the aims and objectives of the proposed revision.[6] The Committee had agreed with the Subcommittee (A/AC.105/736, para. 78) that, while a revision of the Principles was not necessary at the current stage, it was important that States making use of nuclear power sources should conduct their activities in full accordance with the Principles.[7]

68. The Scientific and Technical Subcommittee agreed that, at the present time, revision of the Principles was not warranted. It also agreed that, until a firm scientific and technical consensus had been reached on the revision of the Principles, it would be inappropriate to pass on the topic to the Legal Subcommittee.

69. The view was expressed that the analyses appearing in the documents before the Scientific and Technical Subcommittee at its current session provided a sound basis for the ultimate elaboration of specific technical standards necessitated by the unique nature of the use of nuclear power sources in outer space. That delegation was also of the view that, in the light of the fact that the Principles, having been developed in 1992, had focused almost exclusively upon the protection of the biosphere, consideration should be given to the extension of any newly elaborated safety processes and standards to provide for the broadest range of existing and future applications of nuclear power sources in outer space, including applications on other celestial bodies such as the Moon.

70. The view was expressed that the provisions of the Convention on Nuclear Safety[8] should also be applied to the use of nuclear power sources in outer space and that the IAEA Safety Fundamentals and Standards for terrestrial reactors should be taken into consideration in the design, construction and licensing of nuclear

power sources used in outer space and devices containing such sources. In addition, the provisions of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency[9] should be applied in the case of an accident involving a nuclear power source used in space that could cause contamination of the environment. That delegation was also of the view that the analysis of safety measures for nuclear power sources in outer space should be particularly rigorous for the two phases of greatest risk for the environment, namely their launching and re-entry into the atmosphere.

71. The view was expressed that, recognizing the particular competence and experience of IAEA in ensuring terrestrial nuclear safety, any new standards or principles which might be elaborated in the future for the use of nuclear power sources in outer space should be in conformity with those already existing under the auspices of IAEA. That delegation was also of the view that issues concerning possible accidental contamination of the Earth's environment as a result of the use of nuclear power sources in outer space were of the greatest importance.

72. The view was expressed that the space environment could now be considered an extension of the human environment and that, consequently, issues relating to the use of nuclear power sources in outer space were of the greatest importance. That delegation was of the view that, for that reason, that item should remain on the agenda of the Subcommittee and should be considered on a priority basis.

73. In accordance with General Assembly resolution 55/122, the Subcommittee, at its 555th meeting, on 20 February 2001, reconvened its Working Group on the Use of Nuclear Power Sources in Outer Space under the chairmanship of Sam Harbison (United Kingdom). The Working Group held six meetings. At the meeting held on 23 February 2001, the Working Group adopted its report.

74. At its 560th meeting, on 23 February 2001, the Subcommittee endorsed the report of the Working Group, which is contained in annex III to the present report.

V. Means and mechanisms for strengthening inter-agency cooperation and increasing the use of space applications and services within and among entities of the United Nations system

75. In accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee considered an agenda item on means and mechanisms for strengthening inter-agency cooperation and increasing the use of space applications and services within and among entities of the United Nations system. In accordance with the work plan that it had adopted at its thirty-seventh session (A/AC.105/736, annex II, para. 40), the Subcommittee analysed the current levels of usage of space applications and services within the United Nations system and examined the utility of space applications and services for increasing, with regard to space activities, the effectiveness, efficiency and coordination of the operations of United Nations entities.

76. The Subcommittee had before it the following documents:

(a) Report of the Inter-Agency Meeting on Outer Space Activities on its twenty-first session, held in Vienna from 22 to 24 January 2001 (A/AC.105/756);

(b) Report of the Secretary-General on the coordination of outer space activities within the United Nations system: programme of work for 2001 and 2002 and future years (A/AC.105/757);

(c) Note by the Secretariat containing an analysis of the replies from organizations of the United Nations system to a list of questions circulated by the Secretariat (A/AC.105/C.1/L.241 and Corr.1 and Add.1).

77. At the 550th meeting of the Subcommittee, a forum was held on the activities of the organizations of the United Nations system in space-related areas. The following presentations were made:

(a) "Inter-agency collaborations in space-related areas", by a representative of the Office for Outer Space Affairs;

(b) "WMO and the World Weather Watch's space-based component of the Global Observing System", by the observer for WMO;

(c) "Activities of UNESCO and natural hazards", by the observer for UNESCO;

(d) "The International Strategy for Disaster Reduction", by the observer for the secretariat for the International Strategy for Disaster Reduction;

(e) "Efforts of the organizations of the United Nations system in disaster response and humanitarian operations", by the observer for UNHCR;

(f) "ITU and space-related activities", by the observer for ITU.

78. The representatives of France, Germany and the United States made presentations under this agenda item, which included reports on cooperative activities between Member States and organizations of the United Nations system.

79. The Subcommittee noted with satisfaction that the Inter-Agency Meeting on Outer Space Activities had held its twenty-first session in Vienna from 22 to 24 January 2001. The Subcommittee also noted that the next session of the Inter-Agency Meeting was scheduled to be held in Rome in early 2002, before the thirty-ninth session of the Subcommittee, and would be hosted by the Food and Agriculture Organization of the United Nations.

80. The Subcommittee noted with appreciation the presentations made during the forum on space-related activities of organizations of the United Nations system and agreed that the documentation made available by the Secretariat and the presentations made by the organizations of the United Nations system were a good basis for the Subcommittee to continue its discussion of the item under the second year of the work plan.

81. The Subcommittee invited the Inter-Agency Meeting to consider, at its twenty-second session, in 2002, the barriers to the use of space technology, the theme that would be considered by the Subcommittee at its thirty-ninth session, under the second year of the work plan. The Subcommittee also invited the Inter-Agency Meeting to consider how the Subcommittee could support the work of the Inter-Agency Meeting and the space-related activities of organizations in the United Nations system.

82. The Subcommittee agreed that the World Health Organization, as well as donor institutions in the United Nations system, should be encouraged to actively participate in the work of the Inter-Agency Meeting.

83. The Subcommittee noted that the replies received from organizations in the United Nations system in response to the list of questions circulated by the Secretariat (A/AC.105/C.1/L.241 and Corr.1 and Add.1), indicated that many organizations in the United Nations system were unaware of how space-based services might help them to meet their objectives. The Subcommittee was of the view that it was necessary to approach organizations in the United Nations system more actively to persuade them of the potential advantages of those services.

VI. Implementation of an integrated, space-based global natural disaster management system

84. In accordance with General Assembly resolution 55/122, the Subcommittee considered an agenda item on the implementation of an integrated, space-based global natural disaster management system, in accordance with the work plan that it had adopted at its thirty-seventh session (A/AC.105/736, annex II, para. 41). In accordance with the work plan, the Subcommittee reviewed the types of natural disasters being faced and the extent of the application of space-based services being utilized for their mitigation.

85. The Subcommittee had before it the following documents:

(a) Note by the Secretariat (A/AC.105/753 and Add.1) containing information of relevance to the work plan received from Member States and international organizations;

(b) Report of the Secretariat on the implementation of an integrated, space-based global natural disaster management system (A/AC.105/758), containing information on some of the major disaster reduction strategies and systems worldwide;

(c) Working paper submitted by China on the implementation of an integrated, space-based global

natural disaster management system (A/AC.105/C.1/L.250/Rev.1), also referred to in the report of the Working Group of the Whole (see annex II, para. 4, of the present report).

86. The representatives of Argentina, Brazil, Canada, Chile, China, Ecuador, France, Greece, India, Italy, Japan, Peru, the Russian Federation and the United States made statements under this agenda item.

87. The Subcommittee heard the following technical presentations under this agenda item:

(a) "A small satellite constellation for disaster and environmental monitoring: a proposal for international cooperation on disaster mitigation and environmental management", by the representative of China;

(b) "Disaster management", by the representative of France;

(c) "The Shuttle Radar Topography Mission (SRTM) and its use for disaster management", by the representative of Germany;

(d) "Monitoring natural disasters by remote sensing: waterlogging and floods in Hungary in the period 1998-2000", by the representative of Hungary;

(e) "Integrated space-based global natural disaster management system", by the observer for ESA.

88. Pursuant to a recommendation made by the Committee on the Peaceful Uses of Outer Space at its forty-third session,[10] the observer for CEOS made a presentation entitled "Overview of the use of Earth observing satellites for hazards support".

A. Existing use of space technology for disaster management

89. The Subcommittee noted that many disaster management efforts around the world were using space technologies such as satellite remote sensing, global navigation satellite systems and satellite telecommunications, often in tandem with other advanced technologies such as airborne remote sensing, as well as activities on the ground.

90. The Subcommittee noted the following unique properties of space-based services, making them an important part of effective disaster management efforts:

(a) The synoptic perspective of Earth observation satellites;

(b) The high quality and reliability offered by communications satellites and the fact that they did not rely to a large extent on ground infrastructure that could be damaged by a disaster.

91. The Subcommittee noted that space-based technologies could contribute to all phases of the disaster management cycle, including disaster mitigation, disaster preparedness, disaster relief and disaster rehabilitation.

92. The Subcommittee noted that space-based technologies were being used to support disaster management activities related to, among other things, the following:

(a) Weather forecasting, including forecasting of intensive weather such as tropical cyclones, tornadoes and severe storms, heavy precipitation and extreme temperatures, as well as seasonal to interannual predictions of phenomena such as El Niño;

(b) Flooding, including flash floods;

(c) Landslides;

(d) Coastal hazards;

(e) Wildfires;

(f) Drought and vegetation stress;

(g) Snow and ice cover, as well as ice break-up and avalanches;

(h) Volcanic ash clouds;

(i) Seismic hazards, including tsunamis;

(j) Harmful algal blooms;

(k) Disease outbreaks and pest invasions;

(l) Technological disasters, such as oil spills and air pollution events.

93. The Subcommittee noted the importance of space-based services for providing early warning of disasters of hydrometeorological origin, which accounted for approximately 85 per cent of the damage worldwide from natural disasters. The Subcommittee noted, in particular, that many satellites around the

world had been built for the specific purpose of monitoring weather, including intensive weather.

94. The Subcommittee took note of the following examples of disaster reduction efforts that were making use of space-based services:

(a) In order to reduce the risks of natural disasters in Eurasia, a system has been adopted in the Russian Federation that utilizes information received from the National Oceanographic and Atmospheric Administration (NOAA), Resurs-0 and Okean-0 satellites. The system also involves the use of ground stations, geographic information systems (GIS) and communications networks;

(b) Concerning cyclones, the Cyclone Warning Dissemination System of India was being used to warn coastal areas of incoming cyclones using meteorological and communication payloads of Indian National Satellites (INSAT);

(c) Concerning wildfires:

(i) The United States was implementing a programme to address transboundary smoke in member States of the Association of South-East Asian Nations;

(ii) Brazil and the United States were conducting bilateral activities to use remotely sensed data to track forest fires, and the United States was also providing fire and smoke products via the Internet to identify and monitor wildfires in countries such as Bolivia, Mexico and Peru;

(iii) Greece and the Russian Federation had cooperated to enable information derived from Russian Earth observation satellites to be provided daily for the operational monitoring of forest fires in Greece;

(d) Concerning drought and vegetation stress, the PROCLIMA project of the Centro de Previsão de Tempo e Estudos Climáticos (CPTEC) in Brazil was performing daily assessment of soil water deficit, using satellite remote sensing imagery, was monitoring an area of more than 1.5 million km^2 and was using GIS to allow results to be applied to management decisions by local and federal authorities;

(e) Concerning volcanic hazards:

(i) NOAA of the United States was providing volcanic ash advisory alerts, through ICAO, to the global aviation community every three hours;

(ii) The National Aeronautics and Space Administration (NASA) of the United States was developing new observational models and capabilities for detecting and tracking volcanic eruptions and was developing new techniques to monitor active volcanoes, using information from remote sensing and Global Positioning System (GPS) satellites to monitor crustal deformation, outgassing of sulphur dioxide and temperature change.

95. The Subcommittee took note of the following disasters for which space-based services had played an essential role in assessment, recovery and response operations:

(a) Space-based services had been used to develop regional strategies for damage assessment, hazard mitigation, management of natural resources and GIS applications for Central America as part of the Hurricane Mitch recovery efforts in late 1998;

(b) Images from the Canadian Radarsat satellite had been used to evaluate flooding conditions in Mozambique in the spring of 2000, and the information had been communicated to authorities in Mozambique to assist humanitarian and evacuation efforts;

(c) A comprehensive programme was carried out by the FÖMI Remote Sensing Centre in Hungary to monitor the extent of flooding and waterlogging in the country during 2000;

(d) SPOT, Radarsat, Indian Remote Sensing Satellite (IRS) and Land Remote Sensing Satellite (Landsat) data had been used to investigate damage and topographic changes following the volcanic eruptions at Mount Usu and Miyake Island in Japan in 2000, and the information had been delivered quickly to the public by the media;

(e) Following the earthquake in El Salvador on 13 January 2001:

(i) The Charter to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, signed by ESA, CNES and the Canadian Space Agency, was used to support relief operations;

(ii) NASA was providing El Salvador with Landsat images to support reconstruction efforts;

(iii) NASA scientists were helping to obtain high-resolution IKONOS images of the worst-hit areas;

(f) Space-based services were used to support rescue and relief efforts following the earthquakes in western India in early 2001, through assistance from many States, as well as intergovernmental and non-governmental organizations.

B. Obstacles to the use of space technology for disaster management

96. The Subcommittee noted that earthquakes were still beyond prediction. The view was expressed that accelerated, rigorous research and development were essential to making progress towards operational earthquake forecasting, which would prove immensely valuable in minimizing the loss to human life.

97. The Subcommittee noted that the following were required to make effective use of space-based information for disaster management: (a) reliable and timely data and information; and (b) expertise to use the technology and the information available.

98. The Subcommittee noted that the following were obstacles to the operational use of space-based services:

(a) Poor resolution capabilities and/or revisiting time of many existing Earth observation satellites for certain types of disasters;

(b) A gap between present possibilities for extracting information from satellite data and what was actually needed in an operational context;

(c) Difficulty experienced by some end-users in obtaining sufficient technical equipment to use products from remote sensing.

99. Some delegations expressed the view that the high price of information derived from satellite remote-sensing, especially high-resolution products, was also a serious obstacle to its use in disaster mitigation. Those delegations also expressed the view that it was necessary for enterprises collecting such data to tailor prices to make the data more accessible to developing countries.

C. Efforts to coordinate and to increase the timeliness and reliability of space-based services for disaster management

100. The Subcommittee took note of the Global Disaster Information Network (GDIN), which was contributing to harmonization of data and information products from multiple remotely sensed and in situ sources in order to establish reliable and timely sharing and exchange of data for all phases of disasters. The Subcommittee noted that the GDIN conference on the theme "Information systems and telecommunications in support of health, survival, rehabilitation: from needs analysis to technological development and use" would be hosted by Italy in June 2002.

101. The Subcommittee took note of the Disaster Management Support Group of CEOS, chaired by NOAA, which was addressing natural and technological disaster management on a worldwide basis by fostering improved use of existing and planned satellite data and was moving towards demonstrating a coordinated space agency response to disasters, in close cooperation with international partners such as the secretariat for the International Strategy for Disaster Reduction, the Office for Outer Space Affairs and GDIN.

102. The Subcommittee took note of the Charter to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, signed in Paris on 20 June 2000 by ESA and CNES and on 20 October 2000 by the Canadian Space Agency. The Subcommittee noted that, through the Charter, areas affected by a disaster could have access to satellite imagery from Radarsat, SPOT, the European remote sensing satellite (ERS) and, in the future, Envisat, as well as data interpretation services, by means of a telephone call. The Subcommittee also noted that the Charter had been put into effect during the recent disasters in El Salvador, India and Slovenia.

103. The Subcommittee noted that China was developing a constellation of eight small satellites for disaster management and environmental monitoring.

104. The Subcommittee took note of the ongoing development of the COSMO-SkyMed satellite constellation. The Subcommittee noted that the feasibility of a very short response time and frequent site revisiting opportunities, the capability of near

real-time transmission of data to receiving stations close to the imaged area, all-weather and day-and-night acquisition capability and global accessibility were being considered in identifying system requirements and architecture.

105. The Subcommittee took note of the mechanism being constructed by Japan to make Advanced Land Observing Satellite (ALOS) data available worldwide for disaster monitoring.

106. The Subcommittee noted that, to increase the number of service providers and to disseminate relevant information to every level, the Italian Space Agency was promoting the involvement of small and medium-sized companies in data exploitation activities.

107. The Subcommittee noted that Italy had started several pilot projects to enable the use of remote sensing data to meet operational needs, such as the production of differential movement maps obtained through differential interferometric techniques to evaluate vertical variation with centimetre-level accuracy.

D. Efforts to develop the expertise of potential users of space-based information for disaster management

108. The Subcommittee took note of the following initiatives to develop expertise in using space-based technologies for disaster management:

(a) The United Nations/Chile/European Space Agency Workshop on the Use of Space Technology in Disaster Management, held in La Serena, Chile, from 13 to 17 November 2000, which had identified specific types of disasters of importance to the region of Latin America and the Caribbean, as well as measures to cope with those disasters;

(b) The workshop on natural disaster monitoring by satellite, held in Paris from 30 January to 1 February 2001 under the auspices of CNES, the National Research Institute for Earth Science and Disaster Prevention of Japan and NASDA;

(c) Climate outlook forums, organized by NOAA for Latin America and the Caribbean, Africa, south-east Asia and the South Pacific and aimed at bringing producers of climate information together with potential users in fields such as agriculture, fisheries and disaster relief, for training on applying seasonal climate forecasts to real-world decisions.

109. The Subcommittee took note of missions that could be used to support disaster management, including the Shuttle Radar Topography Mission, the GMS-5 meteorological satellite and the Tropical Rainfall Measuring Mission.

E. Other views expressed on the implementation of an integrated, space-based global natural disaster management system

110. The view was expressed that the Office for Outer Space Affairs should identify financial resources for implementation of the recommendations of UNISPACE III in the area of disaster management.

111. The view was expressed that any integrated, space-based global natural disaster management system should take account of existing systems.

112. The view was expressed that the satellite operators should be invited to give presentations during the second year of the work plan on the disaster management component of their activities and how it could be integrated into a global system.

113. The view was expressed that States should ratify the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations.

VII. Space debris

114. In accordance with General Assembly resolution 55/122, the Subcommittee continued its consideration, on a priority basis, of the agenda item on space debris.

115. The Subcommittee had before it a note by the Secretariat entitled "National research on space debris, safety of space objects with nuclear power sources on board and problems of their collisions with space debris", compiling responses received from Member States and international organizations on the issue (A/AC.105/751 and Add.1 and 2) and a note verbale dated 23 January 2001 from the Permanent Mission of

the Russian Federation to the United Nations (A/AC.105/759) about the planned controlled descent from orbit of the orbital station Mir.

116. The Subcommittee also had before it a working paper containing a proposal on a work plan for the item entitled "Space debris" on the agenda of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space, submitted by Canada, China, France, Germany, India, the Russian Federation, the United Kingdom and the United States (A/AC.105/C.1/L.251/Rev.2), and the following conference room papers: "Ensuring controlled descent of the Mir orbital station", submitted by the Russian Federation (A/AC.105/C.1/2001/CRP.5); "Online Index of Objects Launched into Outer Space", submitted by the Secretariat (A/AC.105/C.1/2001/CRP.13); and "The financial loss due to the space debris hazard", submitted by Japan (A/AC.105/C.1/2001/CRP.15).

117. The representatives of Canada, the Czech Republic, France, Germany, India, Italy, Japan and the United States made statements on this item. The observer for Saudi Arabia also made a statement on this item.

118. The Subcommittee heard the following scientific and technical presentations on the subject of space debris:

(a) "Space debris mitigation in CNES", by the representative of France;

(b) "Efficiency and economical aspects of space debris mitigation measures", by the representative of Germany;

(c) "Cost-effectiveness of space debris mitigation measures", by the representative of the United Kingdom;

(d) "Re-entry of the Compton Gamma Ray Observatory and launch vehicle debris mitigation", by the representative of the United States;

(e) "Index to the United Nations Register of Objects Launched into Outer Space", by a representative of the Secretariat;

(f) "Space debris research at the European Space Agency", by the observer for ESA;

(g) "Updated IAA position paper on space debris", by the observer for IAA.

119. The Subcommittee noted with satisfaction that, at the invitation of the Committee on the Peaceful Uses of Outer Space,[11] a representative of the Inter-Agency Space Debris Coordination Committee (IADC) had made a technical presentation on its activities and views on reducing space debris from launch vehicles. The Subcommittee agreed that IADC should continue to make technical presentations on its work on an annual basis.

120. The Subcommittee noted that international cooperation had continued through IADC, with the participation of Japan, NASA of the United States, ESA, the Russian Aviation and Space Agency, the China National Space Administration, the British National Space Centre, CNES of France, ISRO, the Italian Space Agency, the German Aerospace Centre (DLR) and the National Space Agency of Ukraine, to enable its members to exchange information on space debris activities, facilitate opportunities for cooperation in space debris research, review the progress of ongoing activities and identify debris mitigation options. It also noted that Canada was considering applying for membership in IADC.

121. In accordance with the agreement reached at its thirty-seventh session (A/AC.105/736, annex II, para. 42), the Subcommittee examined the questions of the costs and benefits of debris mitigation measures. As part of that examination, member States reported on:

(a) The costs of various debris mitigation measures;

(b) The consequences, including the economic aspects of taking no debris mitigation measures;

(c) An analysis of the costs and benefits in various debris mitigation scenarios.

122. In accordance with the agreement reached at its thirty-seventh session (A/AC.105/736, annex II, para. 42), the Subcommittee discussed the passivation and limitation of mission-related space debris for launch vehicles, including the cost-benefit aspects (see para. 121 above).

123. The Subcommittee noted that, although adequate attention was being given by member States and space agencies to the above-mentioned issues, further research would be needed to determine whether identified mitigation measures were cost-effective and

could minimize the short-term cost while maximizing the long-term benefit for the space environment.

124. The Subcommittee noted with satisfaction that, as requested by the Committee on the Peaceful Uses of Outer Space,[12] the Secretariat had prepared a sample index to the United Nations Register of Objects Launched into Outer Space, which would provide an easy and quick reference to government announcements of space launches and changes in the status of space objects, including their decay in the atmosphere. It noted that the searchable index, available online on the web site of the Office for Outer Space Affairs, would greatly facilitate its work. The Subcommittee recommended that the usefulness of the index could be enhanced through additional information provided by member States and comments received from its users.

125. The Subcommittee noted with satisfaction that a process of controlled de-orbiting was being gradually introduced by national space agencies for large artificial space objects in order to decrease the probability of collisions in low-Earth orbit, which could lead to the creation of secondary debris, and also to minimize possible damage on the ground caused by falling space objects. It noted that, in addition to regular de-orbiting of Progress-type cargo spacecraft, the Compton Gamma Ray Observatory of the United States had been safely de-orbited on 4 June 2000 and de-orbiting of the Mir manned orbital station was scheduled for March 2001.

126. The Subcommittee agreed that further consideration of space debris was important and that international cooperation was needed to expand appropriate and affordable strategies to minimize the potential impact of space debris on future space missions.

127. The Subcommittee agreed that member States should pay more attention to the problem of collisions of space objects, including those with nuclear power sources on board, with space debris and to other aspects of space debris. It noted that the General Assembly, in its resolution 55/122, had called for the continuation of national research on that question, for the development of improved technology for the monitoring of space debris and for the compilation and dissemination of data on space debris. The Subcommittee took note of the replies from Member States (A/AC.105/751 and Add.1 and 2) that had been submitted to it in accordance with that request. The Subcommittee agreed that national research on space debris should continue and that Member States and international organizations should make available to all interested parties the results of that research, including information on practices adopted that had proved effective in minimizing the creation of space debris.

128. The Scientific and Technical Subcommittee agreed that member States of the Committee on the Peaceful Uses of Outer Space shared a common interest in limiting the production of space debris. The Subcommittee had addressed the topic of space debris over many years and had compiled useful technical information on the debris environment, debris modelling and debris mitigation in its *Technical Report on Space Debris*.[13] The Subcommittee strongly endorsed the action undertaken by IADC to reach consensus on debris mitigation measures and encouraged IADC to treat the topic with due priority, with a view to completing the task during 2002 so that the results could be reported to the Subcommittee at its fortieth session, in 2003. The Subcommittee agreed that a work plan should be established with the goal of expediting international adoption of voluntary debris mitigation measures. In addition to the plan to address debris mitigation measures, it was envisaged that member States and international organizations would continue to report on research and other relevant aspects of space debris.

129. The Subcommittee considered the proposal submitted by Canada, China, France, Germany, India, the Russian Federation, the United Kingdom and the United States (A/AC.105/C.1/ L.251/Rev.2), according to which the Subcommittee would undertake a multi-year work plan on the subject of space debris. In addition, the Subcommittee at its thirty-ninth session would address space debris impact hazards and shielding. The Subcommittee agreed that an item reflecting the proposal should be included in the draft provisional agenda for its thirty-ninth session.

130. The Scientific and Technical Subcommittee agreed that, starting with its thirty-ninth session, in 2002, it should consider space debris according to the following multi-year work plan:

2002	The Subcommittee invites IADC to present its proposals on debris mitigation at the fortieth session of the Subcommittee, in 2003.

	The Subcommittee discusses space debris impact hazards and shielding.
2003	IADC presents (to the Subcommittee) its proposals on debris mitigation, based on consensus among the IADC members.
	Member States review the IADC proposals on debris mitigation and discuss the means of endorsing their utilization.
2004	IADC continues its presentation on its proposals on debris mitigation (as required), based on consensus among its members.
	Member States continue to review the IADC proposals on debris mitigation.
	The Subcommittee may wish to endorse the utilization of the IADC proposals on debris mitigation as guidelines to be implemented on a voluntary basis through national mechanisms.[14]
2005	Member States begin annual reporting on a voluntary basis of national activities to implement the guidelines.

131. The view was expressed that, as indicated in the report on UNISPACE III,[15] the Committee on the Peaceful Uses of Outer Space should examine the various aspects of the space debris issue; therefore, in addition to the discussion of technical aspects, it should also investigate economic, legal and ethical aspects. In the view of that delegation, the discussion of economic aspects in 2001 was a move in the right direction, and the strategy for future years, including possible involvement of the Legal Subcommittee and the Committee itself, could be discussed in 2002.

132. Some delegations expressed the view that the recommended practice of disposing of satellites at a safe distance from the geostationary orbit before the end of their operational life had not been universally applied. In their view, the Scientific and Technical Subcommittee should encourage relevant operational entities to report on possible technical or financial reasons that prevented such end-of-life manoeuvres and to consider ways to ensure that that practice was more widely adopted.

133. The view was expressed that a significant fraction of the total mass of the space debris population was concentrated in a few large space objects that had terminated their activities but were still intact. They were increasing the collision probability in orbit, but actual information about their functional status was usually not officially announced. In the view of that delegation, the practice of submitting authoritative announcements on changes in the functional status of objects contained in the United Nations Register of Space Objects Launched into Outer Space should be adopted by all launching States.

134. The view was expressed that, because of the growing number of cases in which parts of space objects had been found on the ground, the Subcommittee should adopt a follow-up programme for advanced alert and localization of decaying space debris that could cause damage on the ground. That delegation expressed the view that it might be possible to make such information available on the web site of the Office for Outer Space Affairs, as data on the subject were scarce and sometimes contradictory.

135. The view was expressed that providing all interested parties with access to the orbital elements of all catalogued space debris would greatly enhance international cooperation. Similarly, space debris mitigation measures should be made available for possible refinement or usage. In the view of that delegation, according to the principle of "common but differential responsibility", which was commonly accepted in other areas, those who were largely responsible for the creation of the present situation and those who had the capability to take action for mitigation should take lead roles in that matter.

VIII. Examination of the physical nature and technical attributes of the geostationary orbit and of its utilization and applications, including, inter alia, in the field of space communications, as well as other questions relating to developments in space communications, taking particular account of the needs and interests of developing countries

136. In accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee continued its consideration of the item relating to the geostationary orbit and space communications.

137. Representatives of Colombia, the Czech Republic, Ecuador and Indonesia made statements on this item.

138. The Subcommittee had before it a report by the secretariat of the Organisation for Economic Cooperation and Development (OECD) on the status of its work on electromagnetic interference and radio astronomy (A/AC.105/C.1/L.243).

139. The Subcommittee noted with satisfaction that, following the invitation of the Committee on the Peaceful Uses of Outer Space,[16] observers for ITU and IAU made special presentations on the status of their work on frequency interference with radio astronomy.

140. The Subcommittee noted with satisfaction that ITU, IAU and OECD were cooperating closely on the issue of communications interference with radio astronomy. It noted that present regulations of the frequency allocations for radio astronomy were still not sufficient to guarantee that the regions of spectrum allocated to radio astronomy were free of interference from some incompatible communications services. It also noted that standards of the highest quality would be needed to ensure unspoiled reception of natural radio emission from the universe.

141. The Subcommittee agreed that ITU, IAU and OECD should be invited to give presentations on the status of their work on frequency interference with radio astronomy at the thirty-ninth session of the Subcommittee.

142. The Subcommittee noted the importance for its deliberations of information on ITU regulations and resolutions regarding space communications. In order to ensure that that information was widely available, the Subcommittee called on ITU to reconsider its decision to discontinue the publication of the yearly ITU reports, even though most of that information was available on its web site.

143. Some delegations expressed the view that consensus could be reached in the Subcommittee on the following statement: "The geostationary orbit, characterized by its special properties, is part of outer space." Those delegations also expressed the view that reaching consensus on that statement would facilitate possible future discussion of the geostationary orbit, which could then focus on possible evolution of scientific knowledge and measures to increase the benefits of the geostationary orbit for all countries, in particular developing countries. Other delegations expressed the view that, because of its implications, the statement deserved careful study before a final consensus could be reached.

144. Some delegations reiterated the view that the geostationary orbit was a limited natural resource with a number of sui generis characteristics, which risked saturation, and that, therefore, assurances should be given that the benefits of its exploitation would be extended to all nations, regardless of their present technical capabilities. They expressed the view that access to the geostationary orbit should be granted to all nations on an equitable and rational basis, with the Committee on the Peaceful Uses of Outer Space and ITU strengthening their cooperation towards that goal, taking into particular account the needs and interests of developing countries.

IX. Government and private activities to promote education in space science and engineering

145. In accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee considered a single issue/item for discussion on government and private activities to promote education in space science and engineering.

146. The Subcommittee had before it a note by the Secretariat, entitled "Activities of Member States for young people" (A/AC.105/755 and Add.1), containing a compilation of contributions from Member States on the subject.

147. The Subcommittee heard the following technical presentations: "Institute for Space Sciences and Applications of Toulouse (ISSAT) activities for young people", by the representative of France; "CNES activities in education", by the representative of France; "Space education efforts of NASA", by the representative of the United States; and "Private sector space education in the United States", by the representative of the United States.

148. The representatives of Argentina, Australia, Brazil, Canada, Hungary, India, Italy, Japan, Malaysia, Nigeria, Romania and the United States made statements under this agenda item. The observer for Cuba also made a statement under this agenda item. The observer for ISU also made a statement.

149. The Subcommittee noted the activities of Governments, space agencies, non-governmental organizations and research institutes to promote education in space science and engineering. The Subcommittee also noted a number of space education workshops, seminars, university and school programmes organized for students of all ages, ranging from the pre-school level to the postgraduate level and for educators and the general public. Education in space science and engineering had been actively promoted through print and electronic media, such as magazines, teaching materials, Internet web sites and webcasts, and through space camps, space days and space competitions, exhibitions and other public relations events. Those activities had focused on topics such as space science, technology, mathematics, engineering, astronomy, life sciences, rocketry, robotics and space law. The Subcommittee further noted regional and international cooperative programmes and activities to promote education in space science and engineering.

150. The Subcommittee noted the programmes and activities organized during World Space Week, from 4 to 10 October 2000. The Subcommittee noted that education in space science and engineering had been promoted, for example, by the publication of space science books for youth, by the provision of lesson plans and other teaching materials and by the organization of webcasts to engage classrooms in science. The Subcommittee took note of a conference room paper (A/AC.105/C.1/2001/CRP.4) on the activities of Member States during World Space Week 2000. The Subcommittee heard a presentation by the Spaceweek International Association on the international celebration of World Space Week in 2000.

151. The view was expressed that education in space science and engineering remained an important issue and that it should be addressed by the Subcommittee every few years.

X. Draft provisional agenda for the thirty-ninth session of the Scientific and Technical Subcommittee

152. In accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee considered proposals for a draft provisional agenda for its thirty-ninth session, in 2002, to be submitted to the Committee on the Peaceful Uses of Outer Space. Pursuant to paragraph 19 of Assembly resolution 55/122, the Subcommittee requested the Working Group of the Whole, established at its 547th meeting, on 13 February 2001, to consider a draft provisional agenda for its thirty-ninth session.

153. At its 560th meeting, on 23 February 2001, the Subcommittee endorsed the recommendations of the Working Group of the Whole concerning the draft provisional agenda for the thirty-ninth session of the Subcommittee as contained in the report of the Working Group of the Whole (see annex II to the present report).

154. The Subcommittee recommended that its thirty-ninth session be held from 18 February to 1 March 2002.

Notes

[1] *Official Records of the General Assembly, Fifty-fifth Session, Supplement No. 20* (A/55/20), para. 75.

[2] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), chap. I, resolution 1.

[3] See the report of the Expert on Space Applications (A/AC.105/750, paras. 19-28).

[4] United Nations publication, Sales No. E.01.I.7.

[5] United Nations publication, Sales No. E.01.I.5.

[6] *Official Records of the General Assembly, Fifty-fifth Session, Supplement No. 20* (A/55/20), para. 96.

[7] Ibid., para. 97.

[8] International Atomic Energy Agency, "Convention on Nuclear Safety" (INFCIRC/449), annex.

[9] United Nations, *Treaty Series*, vol. 1457, No. 24643.

[10] *Official Records of the General Assembly, Fifty-fifth Session, Supplement No. 20* (A/55/20), para. 116.

[11] Ibid., para. 106.

[12] Ibid., para. 108.

[13] United Nations publication, Sales No. E.99.I.17.

[14] This is a notional schedule. The timing of the endorsement is dependent upon how much time member States require to review and approve the proposed standards.

[15] *Report of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, Vienna, 19-30 July 1999* (United Nations publication, Sales No. E.00.I.3), para. 370.

[16] *Official Records of the General Assembly, Fifty-fifth Session, Supplement No. 20* (A/55/20), para. 118.

Annex I

Documents before the Scientific and Technical Subcommittee at its thirty-eighth session

Symbol	*Agenda item*	*Title or description*
A/AC.105/741	5	Report on the Tenth United Nations/Sweden International Training Course on Remote Sensing Education for Educators (Stockholm and Kiruna, Sweden, 2 May-9 June 2000)
A/AC.105/742	5	Report on the Ninth United Nations/European Space Agency Workshop on Basic Space Science: Satellites and Networks of Telescopes—Tools for Global Participation in the Study of the Universe (Toulouse, France, 27-30 June 2000)
A/AC.105/743	5	Report on the United Nations/Austria/European Space Agency Symposium on Enhancing the Participation of Youth in Space Activities (Graz, Austria, 11-14 September 2000)
A/AC.105/744	5	Report on the United Nations/International Astronautical Federation Workshop on an Operational Strategy for Sustainable Development Using Space (São José dos Campos, Brazil, 28-30 September 2000)
A/AC.105/745	5	Report on the United Nations/International Academy of Astronautics Workshop on Small Satellites at the Service of Developing Countries: the Latin American Experience (Rio de Janeiro, Brazil, 5 October 2000)
A/AC.105/746	5	Report on the United Nations/European Space Agency/Committee on Space Research Workshop on Satellite Data Reduction and Analysis Techniques (Dehra Dun, India, 27-30 November 2000)
A/AC.105/748	5	Report on the United Nations/Malaysia Workshop on Bridging the Digital Divide: Space Technology Solutions (Kuala Lumpur, 20-24 November 2000)
A/AC.105/749	5	Regional centres for space science and technology education (affiliated to the United Nations)
A/AC.105/750	5	Report of the Expert on Space Applications

Symbol	*Agenda item*	*Title or description*
A/AC.105/751 and Add.1 and 2	10	Note by the Secretariat on national research on space debris, safety of space objects with nuclear power sources on board and problems of their collisions with space debris
A/AC.105/752 and Add.1 and 2	4	Note by the Secretariat on international cooperation in the peaceful uses of outer space: activities of Member States
A/AC.105/753 and Add.1	9	Note by the Secretariat on the implementation of an integrated, space-based global natural disaster management system
A/AC.105/754	7	Report by the International Atomic Energy Agency on preliminary review of international documents relevant to the safety of nuclear power sources in outer space
A/AC.105/755 and Add.1	12	Note by the Secretariat on activities of Member States for young people
A/AC.105/756	8	Report of the Inter-Agency Meeting on Outer Space Activities on its twenty-first session (Vienna, 22-24 January 2001)
A/AC.105/757	8	Report of the Secretary-General on the coordination of outer space activities within the United Nations system: programme of work for 2001 and 2002 and future years
A/AC.105/758	9	Report of the Secretariat on the implementation of an integrated, space-based global natural disaster management system
A/AC.105/759	10	Note verbale dated 23 January 2001 from the Permanent Mission of the Russian Federation to the United Nations addressed to the Secretary-General
A/AC.105/760	8	Note by the Secretariat on the World Meteorological Organization
A/AC.105/C.1/L.240	1	Provisional agenda and annotations
A/AC.105/C.1/L.241 and Corr.1 and Add.1	8	Note by the Secretariat on means and mechanisms for strengthening inter-agency cooperation and increasing the use of space applications and services within and among entities of the United Nations system

Symbol	*Agenda item*	*Title or description*
A/AC.105/C.1/L.242	7	Working paper submitted by the United Kingdom of Great Britain and Northern Ireland on the Convention on Nuclear Safety and the Safety Fundamentals of the International Atomic Energy Agency: a common approach to the safety of terrestrial nuclear power sources
A/AC.105/C.1/L.243	11	Information submitted by the secretariat of the Organisation for Economic Cooperation and Development on the status of work on electromagnetic interference and radio astronomy
A/AC.105/C.1/L.244	7	Working paper submitted by the United States of America on a database of international documents of potential relevance to nuclear power sources in outer space
A/AC.105/C.1/L.245	7	Working paper submitted by the United Kingdom of Great Britain and Northern Ireland on the review of international documents on radiation protection of particular relevance to nuclear power sources in space
A/AC.105/C.1/L.246	7	Working paper submitted by the Russian Federation on collisions between nuclear power sources and space debris
A/AC.105/C.1/L.247	7	Working paper submitted by the Russian Federation on national research on the safety of space objects carrying nuclear power sources, including information on national procedures for obtaining final authorization to launch such objects
A/AC.105/C.1/L.248 and Add.1 and 2	14	Draft report of the Scientific and Technical Subcommittee on its thirty-eighth session
A/AC.105/C.1/L.249 and Corr.1	5	Working paper submitted by Canada and China on mechanisms for and means of implementing the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), in particular the actions called for in the Vienna Declaration on Space and Human Development
A/AC.105/C.1/L.250/ Rev.1	9	Working paper submitted by China on the implementation of an integrated, space-based global natural disaster management system

Symbol	*Agenda item*	*Title or description*
A/AC.105/C.1/L.251/Rev.2	10	Working paper submitted by Canada, China, France, Germany, India, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America on the proposal of a work plan for the item entitled "Space debris" on the agenda of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space
A/AC.105/C.1/L.252	5	Proposed work plan for follow-up initiatives of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)
A/AC.105/C.1/WGW/2001/L.1	5 and 13	Draft report of the Working Group of the Whole
A/AC.105/C.1/NPS/2001/L.1	7	Draft report of the Working Group on the Use of Nuclear Power Sources in Outer Space
Conference room papers		
A/AC.105/C.1/2001/CRP.1		Information for participants
A/AC.105/C.1/2001/CRP.2		Provisional list of participants
A/AC.105/C.1/2001/CRP.3	8	Means and mechanisms for strengthening inter-agency cooperation and increasing the use of space applications and services within and among entities of the United Nations system
A/AC.105/C.1/2001/CRP.4	5	World Space Week 2000
A/AC.105/C.1/2001/CRP.5	10	Conference room paper submitted by the Russian Federation on ensuring controlled descent of the Mir orbital station
A/AC.105/C.1/2001/CRP.6	5 and 13	List of issues to be considered in the Working Group of the Whole
A/AC.105/C.1/2001/CRP.7	8	Findings and recommendations on space-based and remote-sensing technologies in the report of the Secretary-General on information for decision-making and participation

Symbol	*Agenda item*	*Title or description*
A/AC.105/C.1/2001/CRP.8	8	Summary of replies by organizations of the United Nations system to the questions contained in document A/AC.105/L.223
A/AC.105/C.1/2001/CRP.9	8	Joint proposal by the Office for the Coordination of Humanitarian Affairs of the Secretariat and the Office of the United Nations High Commissioner for Refugees on how to strengthen the use of remote sensing technology within humanitarian operations
A/AC.105/C.1/2001/CRP.10		Proceedings of the Committee on Space Research/International Astronautical Federation symposium on the theme "Terrestrial hazards from outer space objects and phenomena"
A/AC.105/C.1/2001/CRP.11		Proceedings of the Second Symposium to Strengthen the Partnership of the Scientific and Technical Subcommittee with Industry, on the theme "Emerging applications of global navigation satellite systems"
A/AC.105/C.1/2001/CRP.12	4	Information submitted by the Russian Federation on the International Conference Devoted to the 40th Anniversary of Manned Space Flight
A/AC.105/C.1/2001/CRP.13	10	Online Index of Objects Launched into Outer Space
A/AC.105/C.1/2001/CRP.14	8	Presentations made at the Forum on the Activities of the Organizations of the United Nations System in Space-related Areas
A/AC.105/C.1/2001/CRP.15	10	Conference room paper submitted by Japan on the financial loss due to space debris hazards
A/AC.105/C.1/2001/CRP.16	5	Proposed work plan for the follow-up initiatives of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)
Background documents		
ST/SPACE/5		Seminars of the United Nations Programme on Space Applications
ST/SPACE/6		Highlights in Space, 2000

Annex II

Report of the Working Group of the Whole

1. In accordance with paragraph 19 of General Assembly resolution 55/122 of 8 December 2000, the Scientific and Technical Subcommittee at its thirty-eighth session reconvened the Working Group of the Whole. The Working Group held 9 meetings, from 14 to 22 February 2001, to consider the implementation of recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) and the draft provisional agenda for the thirty-ninth session of the Subcommittee, in 2002. At its 9th meeting, on 22 February 2001, the Working Group adopted the present report.

2. Muhammad Nasim Shah (Pakistan) was elected Chairman of the Working Group of the Whole at the 547th meeting of the Scientific and Technical Subcommittee, on 13 February 2001. The Chairman, in his opening remarks, reviewed the mandate of the Working Group of the Whole at its session in 2001. The Working Group of the Whole noted that Karl Doetsch (Canada) would temporarily serve as Chairman during the elected Chairman's absence at its meetings to be held from 19 to 22 February 2001.

A. Implementation of the recommendations of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)

3. The Working Group of the Whole had before it a list of issues to be considered by it (A/AC.105/C.1/2001/CRP.6). The Working Group of the Whole recalled that the Committee on the Peaceful Uses of Outer Space, at its forty-third session,[a] had taken note of the initiative of the International Astronautical Federation (IAF) and other initiatives to engage non-governmental entities in the implementation of selected recommendations of UNISPACE III and had agreed that the Scientific and Technical Subcommittee should review those initiatives at its thirty-eighth session and report its findings and views on the modalities for engagement of non-governmental entities during the forty-fourth session of the Committee.

4. Canada made a proposal regarding the mechanism and means to implement the recommendations of UNISPACE III, particularly the actions called for in "The Space Millennium: Vienna Declaration on Space and Human Development". During its consideration of the proposal by Canada, the Working Group of the Whole agreed to consider a proposal made by China in the Subcommittee (A/AC.105/C.1/L.250) under the item entitled "Implementation of an integrated, space-based global natural disaster management" within the context of the implementation of the recommendations of UNISPACE III. Having taken into account the proposal by China, Canada revised its proposal and submitted it to the Working Group of the Whole (A/AC.105/C.1/L.249 and Corr.1). China also revised its proposal and submitted it to the Working Group of the Whole (A/AC.105/C.1/L.250/Rev.1).

1. Mechanism to implement the recommendations of UNISPACE III and the modalities for the engagement of non-governmental entities

5. The Working Group of the Whole noted with satisfaction that there was a high level of interest in implementing the recommendations of UNISPACE III among all member States of the Committee on the Peaceful Uses of Outer Space and other States, as well as among space agencies, relevant intergovernmental organizations, including the specialized agencies of the United Nations system and other space-related institutions.

6. In reviewing the proposals before it and taking into consideration the views expressed by member States on the mechanism to implement the recommendations of UNISPACE III and the modalities for the engagement of non-governmental entities, the Working Group of the Whole agreed that it should continue to coordinate activities associated with the assessment and the implementation of recommendations of UNISPACE III, bearing in mind the pivotal role of Governments. The Working Group of the Whole would strive to achieve consensus on the

priorities and courses of action for the recommendations.

7. The Working Group of the Whole agreed that, bearing in mind the agreement referred to in paragraph 6 above, recommendations of UNISPACE III could be assessed and implemented through the voluntary leadership of individual member States and their appropriate governmental institutions on particular actions. Such a mechanism would be open to all interested member States and should be agreed upon by the Committee by consensus. The Working Group of the Whole also agreed that the leaders would make considerations within their teams (which would be open to participation by all interested parties), would seek the broadest possible participation of non-governmental entities and would report to the Scientific and Technical Subcommittee. The Working Group of the Whole further agreed that work to be conducted through that mechanism should be result-oriented, pragmatic, transparent and coordinated by the Committee and should be based on consensus agreement.

8. The Working Group of the Whole recommended that a survey should be conducted among member States to identify the level of interest and priority for each action constituting the nucleus of a strategy contained in the Vienna Declaration. Through that survey, each member State would indicate whether it wished to be the leader or a member of the team to carry out the recommended action and identify non-governmental entities that wished to be members of the team. The Working Group of the Whole requested the Office for Outer Space Affairs of the Secretariat to circulate the survey to member States and to compile the results of the survey in time for the forty-fourth session of the Committee on the Peaceful Uses of Outer Space.

9. The Working Group of the Whole agreed that, as part of the phase of assessment and establishment of priorities, expert groups might be established to conduct research, analyse and make recommendations on particular actions, for example the establishment of global, space-based disaster management systems. The expert groups would be open to the participation of all States interested in a particular action and would be balanced, to the extent possible, in terms of the geographical distribution and the level of technological development of the participating States. The Working Group of the Whole also agreed that each expert group would elect a Chairman, who would be approved by the Subcommittee, and would welcome the participation of relevant non-governmental organizations and institutions, depending on the requirements of the particular action item. The participation of non-governmental entities would be agreed by the members of the expert group.

10. Concerning the implementation of an integrated, space-based global natural disaster management system, the Working Group of the Whole agreed to establish an expert group, with core members from countries with advanced science and technical capability or high vulnerability to disasters, taking into account the principle of equitable geographical distribution. All members would be welcome to participate and should express their desire to become members of the expert group on a voluntary basis. The Working Group of the Whole agreed that the Office for Outer Space Affairs should be informed of nominees, preferably before 1 April 2001. States indicating after 1 April 2001 their interest in joining the expert group would also be able to participate. The Chairman of the expert group would be elected by the members, and the election would be subject to approval by the Committee on the Peaceful Uses of Outer Space. The expert group would then be entrusted by the Subcommittee and the Committee to complete the research stipulated in paragraph 11 below.

11. The Working Group of the Whole agreed that the expert group should conduct related studies and propose a practical plan for a global disaster mitigation management system or systems, presenting the first report to the Scientific and Technical Subcommittee for general discussion at its thirty-ninth session. The report should focus on the following two areas prior to the thirty-ninth session of the Subcommittee, in compliance with the three-year work plan,[5] avoiding duplication of existing activities:

(a) How to fully utilize existing space and ground resources, including those of the United Nations system, such as the International Strategy for Disaster Reduction, and others, such as the Committee on Earth Observation Satellites and the Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, for disaster mitigation and early warning;

(b) How to maintain a sustainable and stable development of existing disaster mitigation systems.

12. The Working Group of the Whole further agreed that the report by the expert group for the fortieth session of the Scientific and Technical Subcommittee should focus on the following two areas, in compliance with the three-year work plan:[b]

(a) Proposals for the future, including any potential operational management system or systems;

(b) Determination of the need to establish a new global disaster mitigation system.

2. Implementation of the plan of action of the Office for Outer Space Affairs

13. The Working Group of the Whole noted that the General Assembly, in paragraph 29 of its resolution 55/122, requested the Secretary-General to begin implementing measures and activities that were contained in the plan of action proposed by the Office for Outer Space Affairs and were currently within the programme of work of the Office, based on the recommendations of UNISPACE III, and to ensure the full implementation of the plan of action with the necessary resources in 2002.

14. The Working Group of the Whole stressed the importance of the full implementation of the plan of action by the Office for Outer Space Affairs with the necessary resources in 2002 and expressed its hope that the General Assembly would take that fully into account.

B. Draft provisional agenda of the Scientific and Technical Subcommittee at its thirty-ninth session, in 2002

15. The Working Group of the Whole noted that, in accordance with General Assembly resolution 55/122, the Scientific and Technical Subcommittee would submit to the Committee on the Peaceful Uses of Outer Space its proposal on a draft provisional agenda for the thirty-ninth session of the Subcommittee, to be held in 2002.

16. The Working Group of the Whole recalled that the Subcommittee, at its thirty-seventh session, had recommended that the following items be considered for possible inclusion in the agenda for its thirty-ninth session, as well as its thirty-eighth session (A/AC.105/736, annex II, para. 43): (a) international cooperation in human spaceflight (proposal by Italy); (b) international cooperation in the use of space systems for global search and rescue (proposal by the United States of America); and (c) regional implications of global climate change (proposal by Egypt). The Working Group of the Whole noted that, during the thirty-eighth session of the Subcommittee, the following items were proposed for possible inclusion in the agenda for the thirty-ninth session of the Subcommittee: (a) space solar power (proposal by the United States); (b) international cooperation in limiting obtrusive space advertising that could interfere with astronomical observations (proposal by the United States); (c) mobilization of financial resources to develop capacity in space science and technology applications (proposal by France, Morocco, Nigeria and South Africa). The Working Group of the Whole also noted the intention of the United States to propose that the item entitled "International cooperation in the use of space systems for global search and rescue" be addressed in the Committee on the Peaceful Uses of Outer Space rather than in the Subcommittee.

17. The Working Group of the Whole recommended the following draft provisional agenda for the thirty-ninth session of the Scientific and Technical Subcommittee:

1. General exchange of views and introduction to reports submitted on national activities.

2. United Nations Programme on Space Applications following the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III).

3. Matters relating to remote sensing of the Earth by satellite, including applications for developing countries and monitoring of the Earth's environment.

4. Items to be considered under work plans:

   (a) Use of nuclear power sources in outer space;

   (Third year of the work plan: preparation of a report that provides the information to the Subcommittee)[c]

(b) Means of and mechanisms for strengthening inter-agency cooperation and increasing the use of space applications and services within and among entities of the United Nations system;

(Second year of the work plan: an identification of the barriers to greater use of space applications and services within the United Nations system and an examination of specific means and mechanisms to eliminate those barriers)[d]

(c) Implementation of an integrated, space-based global natural disaster management system;

(Second year of the work plan: review of existing and proposed satellite and data distribution systems that can be used operationally for disaster management and identification of gaps in those systems. (The review could also extend to pilot projects undertaken by various space agencies, international organizations and Governments through technical presentations. The Committee on Earth Observation Satellites and others could be invited to make presentations on their efforts and studies.))[e]

(d) Space debris.

(First year of the work plan: invitation to the Inter-Agency Space Debris Coordination Committee to present its proposed debris mitigation standards and discussion of space debris impact hazards and shielding)[f]

5. Single issues/items for discussion:

(a) Examination of the physical nature and technical attributes of the geostationary orbit and its utilization and applications, including in the field of space communications, as well as other questions relating to developments in space communications, taking particular account of the needs and interests of developing countries;

(b) International cooperation in limiting obtrusive space advertising that could interfere with astronomical observations;

(c) Mobilization of financial resources to develop capacity in space science and technology applications.

6. Draft provisional agenda for the fortieth session of the Scientific and Technical Subcommittee, including identification of subjects to be dealt with as single issues/items for discussion or under multi-year work plans.

7. Report to the Committee on the Peaceful Uses of Outer Space.

18. The Working Group of the Whole noted that item 4 (d), in paragraph 17 above, entitled "Space debris", would be considered in accordance with the work plan adopted by the Subcommittee (A/AC.105/761, para. 130).

19. With regard to item 5 (b), in paragraph 17 above, entitled "International cooperation in limiting obtrusive space advertising that could interfere with astronomical observations", the Working Group of the Whole agreed that space-related scientific organizations such as the International Astronomical Union should be invited to conduct a background study on the subject and present the results to the Subcommittee to facilitate its work.

20. With regard to item 5 (c), in paragraph 17 above, entitled "Mobilization of financial resources to develop capacity in space science and technology applications", the Working Group of the Whole agreed that the results of the United Nations/International Astronautical Federation Workshop on Making Space Applications Operational, to be held in Albi, France, in September 2001, should be reported to the Subcommittee. The Working Group of the Whole also agreed that funding institutions participating in the Workshop should be invited to make presentations to the Subcommittee at its thirty-ninth session under that agenda item.

21. The Working Group of the Whole recommended that the Committee on Space Research and IAF, in liaison with member States, should be invited to

arrange a symposium on the theme "Remote sensing for substantive water management in arid and semi-arid countries" with as wide a participation as possible, to be held during the first week of the thirty-ninth session of the Subcommittee.

22. The Working Group of the Whole recalled its agreement that the annual symposium on strengthening the partnership with industry, to be held during the thirty-ninth session of the Subcommittee, in 2002, should focus on the promising area of very high resolution remote sensing and its impact on operational applications and should discuss the new space market situation.[g]

C. Other matters

23. The Working Group of the Whole recommended that it be reconvened during the thirty-ninth session of the Scientific and Technical Subcommittee.

Notes

[a] *Official Records of the General Assembly, Fifty-fifth Session, Supplement No. 20* (A/55/20), para. 77.
[b] A/AC.105/736, annex II, para. 41.
[c] A/AC.105/697 and Corr.1, annex III, appendix.
[d] A/AC.105/736, annex II, para. 40.
[e] A/AC.105/736, annex II, para. 41.
[f] A/AC.105/761, para. 130.
[g] A/AC.105/736, annex II, para. 12.

Annex III

Report of the Working Group on the Use of Nuclear Power Sources in Outer Space

1. At its 555th meeting, on 20 February 2001, the Scientific and Technical Subcommittee re-established its Working Group on the Use of Nuclear Power Sources in Outer Space under the chairmanship of Sam A. Harbison (United Kingdom of Great Britain and Northern Ireland).

2. At the 1st meeting of the Working Group, on 20 February 2001, its Chairman recalled the tasks before the Working Group and the work plan of its deliberations for developing a framework of safety assurance processes and standards for nuclear power sources in outer space (A/AC.105/697 and Corr.1, annex III, appendix), approved by the Scientific and Technical Subcommittee at its thirty-fifth session. In accordance with the work plan, the Working Group in 2001 was to review national and international processes, proposals and standards and national working papers relevant to the launch and peaceful use of nuclear power sources in outer space.

3. The Working Group had before it the following documents: a note by the Secretariat entitled "National research on space debris, safety of space objects with nuclear power sources on board and problems of their collisions with space debris" (A/AC.105/751 and Add.1 and 2); a report by the International Atomic Energy Agency (IAEA) entitled "Preliminary review of international documents relevant to the safety of nuclear power sources in outer space" (A/AC.105/754); two working papers submitted by the Russian Federation, entitled "Collisions between nuclear power sources and space debris" (A/AC.105/C.1/L.246) and "National research on safety of space objects carrying nuclear power sources, including information on national procedures for obtaining final authorization to launch such objects" (A/AC.105/C.1/L.247); two working papers submitted by the United Kingdom of Great Britain and Northern Ireland, entitled "Convention on Nuclear Safety and the Safety Fundamentals of the International Atomic Energy Agency: a common approach to the safety of terrestrial nuclear power sources" (A/AC.105/C.1/L.242) and "Review of international documents radiation protection of particular relevance to nuc power sources in outer space" (A/AC.105/C.1/L.2 and a working paper submitted by the United State America entitled "A database of internati documents of potential relevance to nuclear po sources in outer space" (A/AC.105/C.1/L.244).

4. In its deliberations, the Working Group took account the information provided in two techn presentations made by representatives of the Un States to the Scientific and Technical Subcommi entitled "International documents of pote relevance to nuclear power sources in outer space" "Nuclear power source launch approval process in United States of America". At the 3rd meeting of Working Group, on 21 February 2001, the observe IAEA provided an overview of the procedures mechanisms currently utilized by the Agency prepare and review safety standards for terres nuclear applications.

5. Based upon its consideration of the presentati reports and working papers mentioned in paragrap and 4 above, the Working Group discussed and rea preliminary agreement upon a draft outline of report called for in the work plan (see the append the present annex). The draft outline would, how remain subject to further consideration and infor inter-sessional consultations by delegations and w only be finalized at the commencement of discuss during the thirty-ninth session of the Scientific Technical Subcommittee.

6. The Working Group noted that the content o report called for in the work plan would be d extensively from the presentations, reports working papers that had been submitted, and deliberations that had ensued, during the meetin the Scientific and Technical Subcommittee and Working Group in 2000 and 2001.

7. The Working Group agreed that addit materials would still be required in order to com the report called for in the work plan. It welcome offers of the delegations of France, the Ru

Federation and the United States and the observer for IAEA to prepare draft texts for consideration in that regard.

8. The Working Group agreed that, depending on the timing of submission of the additional draft texts, it might be both feasible and beneficial to conduct informal consultations among interested members of the Working Group during the forty-fourth session of the Committee on the Peaceful Uses of Outer Space, in 2001, with a view to advancing the development of the report called for in the work plan.

9. The Working Group noted that IAEA had a highly structured process and framework for developing and promulgating terrestrial nuclear safety standards. It also noted that IAEA also had complementary and less formal mechanisms for conducting detailed technical reviews, which the Working Group might wish to consider in the future.

10. Some delegations expressed the view that, should the Scientific and Technical Subcommittee decide in the future that further work was required on the Principles Relevant to the Use of Nuclear Power Sources in Outer Space (General Assembly resolution 47/68 of 14 December 1992), careful consideration should be given to the potential advantages of utilizing the relevant expertise of IAEA.

11. The Working Group engaged in a more detailed consideration of the differences between the use of nuclear power sources in outer space and terrestrial nuclear applications, focusing particularly on the following aspects that it had identified in 2000 (A/AC.105/736, annex III, para. 8):

(a) Nature of the applications;

(b) Operating environment;

(c) Nature and autonomy of operation of systems;

(d) Quantity of the radioactive material;

(e) Frequency and duration of use;

(f) Distance to, and the effects of normal operation and potential accidents on, populated areas;

(g) Complexity and designed reliability of systems;

(h) Use of passive and/or active systems;

(i) End of service.

12. The Working Group also discussed the similarities and differences between uses and applicable standards for packaging and transportation of radioactive sources used in terrestrial and space applications.

13. The Working Group recommended that it be reconvened during the thirty-ninth session of the Scientific and Technical Subcommittee.

14. At its 6th meeting, on 23 February 2001, the Working Group adopted the present report.

Appendix

Draft outline of the report called for in the work plan

I. Introduction

A. Review of the multi-year work plan

B. Reference to existing Principles Relevant to the Use of Nuclear Power Sources in Outer Space

II. Factors that differentiate nuclear power sources in outer space from terrestrial nuclear applications

Highlighting of differences

III. Existing conventions and procedures that have potential applications to nuclear power sources in outer space

A. Focus on technical, as opposed to legal (e.g. liability), conventions and procedures

B. Discussion of the varying applicability of the various conventions and procedures

1. Demonstration of where existing international conventions are already being applied

2. Explanation of why other international conventions are not applicable

C. Summary of space nuclear power source launch approval processes

IV. Existing nuclear safety and radiation protection documents potentially relevant to nuclear power sources in outer space

A. Identification of international documents (particularly the Safety Series documents of the International Atomic Energy Agency and recommendations of the International Commission on Radiological Protection) that are potentially relevant to the launch and operation of nuclear power sources in outer space

Reference to the relevance matrix in the working paper submitted by the United States of America entitled "A database of international documents of potential relevance to nuclear power sources in outer space" (A/AC.105/C.1/L.244)

B. Description of development and agreement processes for nuclear safety and radiation protection standards

V. Potential future developments relevant to nuclear power sources in outer space

A. Input to be provided by interested delegations, particularly with respect to new space nuclear reactor applications and to the use of nuclear power sources on other celestial bodies

B. Other considerations involving potential risk to nuclear power sources from space debris (to be coordinated with ongoing debris discussions of the Committee on the Peaceful Uses of Outer Space)

VI. Observations

Observations to be submitted by delegations based on a review of reports and presentations made during previous meetings of the Scientific and Technical Subcommittee and its Working Group on the Use of Nuclear Power Sources in Outer Space

Annex. List of international documents and recommendations that are of possible relevance to nuclear power sources in outer space